AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph bridging pages 23 and 24 with the following amended paragraph:

In one embodiment, the reaction is controlled by independent means such as for example electromagnetic radiation such as for example UV-vis, X-ray, or γ-ray instead of or in addition to reliance only on time, temperature of a water bath and the reactants in the polymerization mixture. In one form of this embodiment, heat may be added from a heat source or removed by cooling means in contact with a significantly large portion of coolant of the thermal mass and in the reactor under the control of feedback to maintain the temperature of the reaction mass in the desired temperature range or to vary it during the reaction if desired. In another form, variable intensity or variable wavelength X-rays may be used to control the polymerization rates of the mixing reactions at a rate such that the exotherm is under control. X-ray radiation penetrates the column to impart energy throughout the column or at a selected location to increase [of] or decrease polymerization rates. This may be done by irradiating the monomer sufficiently to disassociate its double bonds to make monomers free radicals and thus increase their reactivity.

Another way is to use an initiator sensitive to the radiation that is activated by the radiation in the temperature region to be used for the reaction mass. The monomers and the initiators affected directly by the radiation to affect polymerization hereinafter from time to time being referred to as first substances. The initiator is chosen to have an activation time and temperature considerably less than that of the monomers alone.

Because the initiator forms free radicals only upon radiation of sufficient intensity, the radiation may be used to control the polymerization reaction independently of the other factors. Another way is to use the radiation sensitizers or scintillators in combine with ~~photo-initiators~~ photo-initiators to initiate the polymerizations. The radiation sensitizers such as x-ray scintillators transfer the energy of radiation ~~s~~ to photo–initiators by luminescence of the photos at the desired wavelength after absorbing the radiation energy transferred through the solvents. The radiation sensitizers such as scintillators from time to time hereinafter being referred to as second substances. The wavelength of the luminescence should be the same as the absorption wavelength of the photo-initiator.

Please replace the first full paragraph on page 25 with the following amended paragraph:

Polymerization using irradiation such as x-ray is used for preparing monolithic materials with cross sections from micrometers to meters. X-rays can penetrate the materials in depth. Both organic and inorganic polymers can be prepared using x-ray or γ-ray. High energy x-ray and γ-ray can travel the materials in high depth. Low energy to medium x-ray penetrates the materials in less depth resulting in a longer polymerization time but is safer to use. In one embodiment, a lower energy x-ray is used to initiate the polymerizations using the combination of x-ray scintillator and ~~photo-initiators~~ photo-initiators. We have discovered that non-thermal (photoinitiation) control of polymerization times from less than 12 hours to more than one week provides satisfactory chromatographic columns. Thermal polymerization of columns usually suffers from

runaway exothermic reaction and extreme temperature gradients with columns over 20 mm in diameter (over 10 mm in radius). This causes ununiformities which degrade chromatographic properties. The slower, controlled, polymerization rate available with x- or γ-rays, or even UV causes a slower polymerization with tolerable rates of exotherm while still maintaining reasonable rates of polymerization. Thermal gradients to exotherm maybe made small enough to not degrade the properties of columns over 1 meter in diameter.

Please replace the first full paragraph on page 129 with the following amended paragraph:

In some embodiments, pressure may be applied through the piston 184 by applying air through the conduit 186 to move the piston inwardly against the reaction mixture 182 in a manner described above in connection with other embodiments. In the preferred embodiment, the apparatus 170 is a small user friendly cabinet x-ray system resembling a microwave in that it has a door and controls mounted on the cabinet. It uses low voltage levels and can be operated by personnel safely from next to the cabinet because it has low penetration which is sufficient however for large columns. It is suitable for the polymerization of this invention because processes described hereinabove use added substances to aid in polymerization such as photo initiators hereinafter from time to time referred to as first substances , fluorescing solvents, or porogens, x-ray sensitizers and/or scintillators hereinafter from time to time referred to as second substances . This unit permits x-ray control of the polymerization and other units such as those of ~~FIG.~~ FIGS. 10 and 11 permit other radiation control of polymerization, thus permitting for example

control of polymerization with the aid of radiation up to a point and finishing the polymerization using heat to decrease the time and yet avoid destructive head build-up.[.]